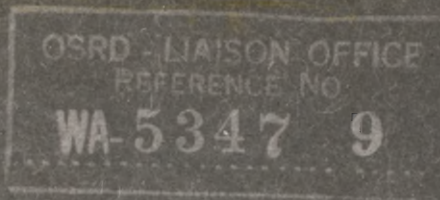


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**OBERFELDARZT PROFESSOR HUGO SPATZ**  
**THE DEPARTMENT OF BRAIN RESEARCH**  
**KAISER WILHELM INSTITUTE**

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Reported by

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CIOB Target 24/82a  
MEDICAL

COMBINED INTELLIGENCE OBJECTIVES SUB-COMMITTEE  
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PERSONNEL OF TEAM

Major G. E. Smith, R.A.M.C.



REPORT ON THE KAISER WILHELM INSTITUTE  
(DEPARTMENT OF BRAIN RESEARCH)  
AT PRESENT OCCUPYING THE PREMISES OF  
THE INSTITUTE FOR PSYCHIATRY IN MUNICH

The interview took place on the 27th and 28th May, 1945

Personnel interviewed -

Oberfeldarzt Professor Hugo Spatz - Director  
Stabsarzt Dr. R. Lindenburg - Assistant

Cooperation - excellent; almost cordial. Our impression was that nothing was being held back.

Notes on the general scheme for the reception and treatment of neurosurgical and neurological cases in the German Army and Air Force.

The planning for this, particularly as it affected the German Air Force, was directly due to Professor Tonnies. In 1941, 4 mobile neurological field hospitals were established, and these were stationed on the Russian front. Each hospital was situated from 60 to 100 kilometres behind the front line. Each hospital was a self-contained unit; the personnel consisted of one experienced neurosurgeon, two or three assistant surgeons, one neurologist, one ophthalmologist and usually, but not invariably, an aural surgeon and a maxillo-facial surgeon (note - in the German forces a maxillo-facial surgeon appears to undertake all necessary plastic surgery). The hospitals were staffed by fully-trained nursing sisters. The sick and wounded were transported to the hospital, in principal, by air evacuation. For this purpose each hospital was in possession of 3 Stork 'planes. Transport of patients from the forward hospitals to the main neurosurgical centre in Berlin was carried out by ambulance train. Professor Tonnies himself was responsible for all the head injuries in the Luftwaffe. When, as often happened, neurosurgical operations were undertaken in field hospitals by general surgeons, no elaborate neurosurgical operations were carried out, a superficial toilet was all that was usually done. There was a very efficient pathological service, and by this means every fatal case admitted to a forward neurosurgical hospital was submitted to post mortem examination. The brain, and when necessary the spinal cord, were removed and were at once fixed in normal saline. They were then sent direct to Prof. Spatz at Berlin.



## Results

Professor Spatz knew really very little about the clinical aspects; he referred us to Professor Tonnies for this information. However, so far as he knew, the results were roughly as follows - 75 percent of all deaths resulting from head injury were due to frank generalised meningitis. In discussing this question at length with Stabsarzt Dr. Lindenburg it transpired that the results were really not very much better than those obtained during the last war.

## Penicillin

This was not used until some small amounts were tried out in 1945. So far as he knew none was used in the neuro-surgical hospitals at the front or in Berlin, and he thought that when used it was given systematically only. He himself had no knowledge at all of penicillin or its uses.

Professor Spatz demonstrated many diagrams illustrative of the manner of spread of infection within the brain. Apart from the local development of subdural and subarachnoid infection the most common and deadly sequel of a gunshot wound of the brain was a diffuse spreading encephalitis with final involvement of the ventricular and cisternal spaces. Such cases of diffuse spreading infection were, in his experience, invariably fatal. He did not think that any special bacterial organisms were encountered. The infections were produced by the usual streptococci, staphylococci and pneumococci. Their only therapeutic resource for a spreading intracranial infection was repeated lumbar puncture with replacement by air. The rationale of this treatment, apart from the good effect produced by the withdrawal of fluid and lowering of intracranial tension, was that an increased production of C.S.F. was thereby obtained, and a consequent carrying into the subarachnoid space of an increased quantity of antibody.

## Mechanism of closed head injuries

Their opinions were very much the same as those held in England and the U.S.A. They considered that oedema played a very minor role and that the symptoms of closed head injury were not due to generalised oedema. However, focal oedema may be of importance in the production of focal signs, e.g., compression of the third nerve by the swollen uncus. They believed that the sympathetic fibres in the third nerve were unduly susceptible to compression by oedema, and that in this lies the explanation for the persistent mydriasis so often seen in severe head injuries.



Experimental Concussion

They knew little of this personal observation, but they had obtained an abstract of the paper published by Denny-Brown and Richie Russel and they thought that in Germany Professor Peters had carried out some similar observations.

Mechanism of Concussion

Professor Spatz did not like the division of commotio Cerebri on the basis of duration of unconsciousness as was being done by some German neurologists. He thought rather that concussion was a generalised disturbance of cerebral function. Pathologically the brain damage in closed head injuries was commonly in the cortex, but concussion was cerebral commotion without demonstrable brain damage. Unconsciousness has really nothing to do with lesions in the cerebral hemispheres. He has examined many cases in which he has found evidence of brain stem damage. But, on the other hand, he has examined many cases of closed head injury with prolonged coma in which he was quite unable to find any adequate pathological lesion.

Traumatic Epilepsy

He had nothing at all to offer.

Treatment of Closed Head Injuries

This was stereotyped. As a general routine every case of closed head injury in which amnesia occurred was treated by 3 to 4 weeks of strict bed rest. Thereafter graduated exercises were begun, but the process of rehabilitation appears to have been somewhat long. More recently they have tended to shorten the treatment, and minor cases of head injury have been kept in bed for a period of about a fortnight only.

Vaso-motor instability in cases of closed head injury

They laid considerable stress on this and believed it was the predominating if not sole cause of the commonly observed post-traumatic syndrome. Professor Spatz believed that it is due to a lesion of the brain stem, but he had no evidence to substantiate this. Post traumatic vertiginous attacks are not epileptic, but he had no notion as to what the cause may be.

Pathological work at present being undertaken by Professor Spatz and his assistant



This appeared to be almost nil. They abandoned the Kaiser Wilhelm Institute in March 1945, taking with them to Munich the clinical notes and photographs of some 2,000 cases of head injury. The brains were left behind and may or may not be now in existence. They did not personally examine any typhus brains; these were examined by Professor Hallevordin. When the Kaiser Wilhelm Institute was broken up Professor Hallevordin went to Dillingen (near Frankford A/M) and Professor Spatz thought that some of the typhus brains were in his possession. During the course of the war Professor Spatz had not seen any cases of unusual encephalitis nor has he seen any evidence of the occurrence of encephalitis lethargica.

### Impression

The impression we gained was that the Kaiser Wilhelm Institute, or at least that part of it concerned with brain research and neuropathology, had spent the whole war collecting brains, and that they had in fact achieved nothing. In any event the material collected has probably been lost forever. Their work in general seems to have been based on rather old-fashioned morbid anatomy and will probably be sterile.

### REPORT ON INTERVIEW WITH GENERAL ARZT, PROFESSOR TONNIS AND HIS STAFF AT BADISCHL (NEAR SALZBURG) ON 30TH MAY 1945

The town and neighborhood of Badischl has been a hospital center for neurological and neurosurgical cases since 1943. The patients have been accommodated in hotels and in general they have come from the Russian front. Since January 1945, a large increase of cases was received owing to the abandonment of the neurosurgical center in Berlin. Professor Tonnis has himself been at Badischl since January 1945. Although he was attached to the German Air Force 80 to 90 percent of his cases were drawn from the Army. The hotels in which the German neurological and Neurosurgical cases were then accommodated were hardly converted and the conditions were and are only just adequate. There were, at the time of our visit, 640 German doctors there. Their work was supervised by an American administrative officer.

### General review of neurosurgical practice in Germany as given by Professor Tonnis.

In 1942 he designed 4 mobile neurosurgical hospitals to work behind the Russian front. These hospitals were 50 to 100 kilometres behind the fighting zone, and transport of wounded was, in theory, by air. The interval between wounding and the arrival at the forward neurosurgical hospital was too variable for him to be able to give any reliable mean figure.



It appeared to have been often as long as 3 or 4 days (we learnt subsequently that the air transport of wounded was almost entirely abandoned after 1942 - this was due to shortage of petrol). Once admitted to the forward neurosurgical hospital cases were detained for some weeks. Indeed it was subsequently laid down in a German War Office Order that all cases of head injury in which there was any suspicion of infection developing would remain in hands of the operator for a minimum period of 3 weeks. The evacuation of the wounded from the forward hospital to the base hospital in Berlin was by ambulance train. There were in Berlin 2,000 neurosurgical beds at Professor Tonniss' disposal, and when these were full, he could transfer patients to other hospitals. They were particularly satisfied with their post mortem service. Autopsy was carried out in all cases of death and in every case brought in dead to the hospital. From 1943 to 1944 every brain obtained was fixed without cutting and sent to Professor Spatz in Berlin. From 1944 onwards the brains were preserved only if the cases were considered to be of interest. They kept exact statistics of all the wounded from the time of admission up to the final disposal, and thereafter the cases were followed up whether or not the man was still in the Army.

#### The aim of treatment (primary neurosurgical operation)

The complete excision of the wound; cleansing of the track and removal of clot, damaged brain and foreign bodies were the ideals aimed at. Particular stress was laid on the thorough cleansing of the subdural and subarachnoid spaces adjacent to the track. The reason for this was their belief that subdural abscesses and direct meningitis often took their origin in blood clot in these regions. However, the greater danger was development of encephalitis spreading along the track in the brain with infection of the ventricular system and a resulting indirect meningitis. This latter was the most common course of an established infection and was almost invariably fatal.

#### Treatment of infection in brain wounds

As soon as there was reason to suspect that infection of any degree had set in they employed sulphonamides, the favorite being Cibazol (Hoffman la Roche), or Tibitin (Bayer) where they suspected streptococcal infection. Eubasine was used in pneumococcal infection and for meningococcal meningitis. Their only other line of attack in cases of meningitis was C.S.F. drainage and air replacement. The criteria for this form of treatment were the clinical signs and the C.S.F. findings. In any post-operative head wound, if the cells in the C.S.F. ran to 300 or over, C.S.F. drainage and



air replacement was begun. This procedure was carried out by the lumbar route and with the head and shoulders raised to  $30^{\circ}$  from the horizontal. As much C.S.F. as possible was removed and an equivalent amount of air injected. This procedure was carried out daily until the pleocytosis in the fluid fell below 300 per cubic millimetre. The rationale for this treatment was not so much simple withdrawal of C.S.F. and reduction of intracranial pressure as the belief, held by Tonnis, that the injected air acted as a stimulus to the production of C.S.F.

#### Demonstration of surgical technique

Six cinema films were shown indicating Professor Tonnis' technique in traumatic brain surgery. The essential details did not differ substantially from those employed in this country. Local anaesthesia was always used with, however, Hyoscine, Evipan or Avertin in cases where the patient was violent or very excited. Diathermy was not used in order to obtain haemostasis; instead they depended on the application of silver clips and gauze pads. The surgical field was kept dry by suction and a sucker was also employed to clean out the intracerebral track. It appeared to us, however, that the handling of the sucker was anything but gentle, and we further noticed that a forceps was usually used in the removal of intracranial foreign bodies, and that it was somewhat roughly introduced and moved about in the brain in order to detect their presence. The wound having been cleaned out the dura was closed with continuous sutures, and any defect whose edges could not be opposed was covered with pedicle graft of galea which was swung round and sutured over the defect. Sulphonamide powder was very liberally used both intra- and extra-durally, a dessert spoon being the measure used, and finally a large rubber drain was laid along the dural tear and over this the scalp was closed by subcuticular sutures. In wounds involving the paranasal sinuses and orbital cavities they always attempted to repair the dural defect at the time of the primary operation, and to this end they generally used a graft taken from the galea or temporal fascia. In those cases where a tear had been missed at the time of the primary operation they carried out an operation for the repair of the dural defect later and used either a graft as before or a fascia lata graft.

#### Repair to bone defects

No film of this was shown. Their procedure was to close small defects and those covered by the hair with bone grafts cut from the tibia. In cases of defect of the frontal bones they employed plates made from "pallidon" (an acrylic plastic).



## Results of surgical treatment of wounds of the brain

Professor Tonnis stated that about 30,000 cases were treated in the neurosurgical hospitals under his immediate supervision. For obvious reasons the final statistics were not available, but the end results were approximately as follows:

Died as a direct result of the wound	32 percent
Requiring further treatment	15 percent
Fit for work of some kind or another	53 percent

However, it appeared to us very doubtful if the real incidence of infection and causes of death was known for the whole series. Such statistics as we were able to obtain were obviously based on relatively small series of cases. Thus, in a series of 929 cases of brain wounds, i.e., cases in which the dura was penetrated, the following results were obtained - died, 310 (i.e., 33.4 percent). Of these 310 deaths 191 died of meningitis, abscess or encephalitis, and 46 of progressively increasing intracranial pressure; 28 cases were moribund on admission, and in 45 cases death was due to causes other than the brain wound. Arguing from a different series of cases Professor Tonnis stated that of 225 cases of infected wounds of the brain 180 died. Questioned as to whether any increase of severity or incidence of infection had taken place during the course of the War he said that both had tended to increase as time went on. He attributed this deterioration to the greater number of wounds caused by mines and grenades. He did not observe any essential differences between the type of wound seen on the Western and Eastern fronts except in so far as the severity of the Russian winter acted adversely on the general condition of the wounded. He had noticed, however, that in warm and wet weather they tended to see occasional cases of gas infection of the brain.

## Disposal of head wounds when treatment completed

No fixed instructions were laid down by the Wehrmacht and all cases were treated on their individual merits. In general every effort seems to have been made to retain men in the service even though a severe penetrating wound had been sustained. Of all cases of penetrating wounds about 50 percent returned to duty. Of a group of cases so wounded early in the War 35 percent were still in the Army when followed up 3 years later, but mostly in low categories. Professor Tonnis thought that perhaps 3 to 5 percent at most were fully fit, i.e., front-line troops.



### Excision of cortical scars

In cases of traumatic epilepsy Professor Tonnis has carried out a large number of cortical excisions. He excised the scar and track down to the ventricle, and claimed that in 75 to 80 percent of cases of traumatic epilepsy he effected a cure following cortical excision! He cannot, however, give exact figures nor has he any views on the incidence of epilepsy following head injuries.

### Wounds of the spinal cord

Spinal wounds were under the control of Oberarzt Schmidt, and he had charge of a special hospital for their treatment at Dorpat, but Professor Tonnis was ignorant of its present whereabouts. The indication for open operation on the spine were the presence of metallic or bone foreign bodies within the vertebral canal. No formal instructions were laid down as to the management of the bladder. Cystotomy was not the rule. Usually a catheter was tied in for the first two weeks and thereafter, aided by mechanical expression of the urine, they hoped to establish an automatic bladder. Tidal drainage was not employed.

### Peripheral nerve lesions

Wounds involving peripheral nerves were often, though not invariably, treated in neurosurgical hospitals. Professor Tonnis regarded the most important point in treatment of nerve injuries as being the maintenance of fully mobile joints. When operation was undertaken they attempted to obtain an end-to-end anastomosis. Nerve grafts were never employed.

### Impression

In general the value of the information we have been able to obtain is of a negative nature. We were unable to collect any evidence which would suggest that the German neurosurgeons possessed any general or specific procedure, whether surgical or chemo-therapeutic, superior to our own. Indeed the truth is, as it appears to us, that their neurosurgical technique is somewhat rough and crude, but we think it is to their total ignorance of the uses of penicillin that the high incidence of infection and the high mortality must be ascribed. It is perhaps worth pointing out that nothing in Professor Tonnis' bearing, and nothing expressed or implied by him or his assistants, suggested for a moment that they were in any way dissatisfied with their own results. It struck us as not the least remarkable indication of this



of this attitude of complacency and self-sufficiency that no-one ventured to ask for any details or figures relating to the treatment and results obtained by us in cases of head injury. Professor Tonnis was very ready to talk and probably tended, if anything, to exaggerate rather than hold back information. We feel it right to say that we were by no means favourably impressed by him. He is clearly a person of strong personality, and he has used this and his high rank and position to obtain quite a large measure of local influence. He has been aided in this by the presence of a large number of German Military hospitals in and around Badischl, and the consequent magnitude of the problems which thus arose; he probably feels he is indispensable to the local allied Military government. In view, therefore, of the special position which he appeared to occupy, we feel it might perhaps be advantageous to investigate his previous political activities.

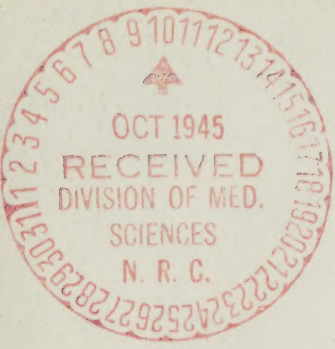
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